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(54) POWDERY RELEASING AGENT FOR MOLTEN METAL FORGING

(57)Abstract:

PURPOSE: To obtain a powdary mold releasing agent to be used by spraying to the inner surface of a mold, composed exclusively of an inorganic compound as a powdery or granular lubricant and having excellent molten metal forging workability to prevent the seizure of the product and the generation of internal defects.

CONSTITUTION: This releasing agent is composed exclusively of inorganic compounds to be used as a lubricant in solid state, exhibiting powdery or granular state and consisting of one or more compounds selected from talc, mica, boron compound, etc. Exclusively inorganic compounds or exclusively a mixture of organic and inorganic compounds may be used as the lubricant in solid state. Water is absent in each case.

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CLAIMS

[Claim(s)]

[Claim 1] The powder release agent for liquid metal forging which consists only of an inorganic compound used as lubricant in solid form, has the gestalt of that an inorganic compound is powdered or granularity, and is characterized by using one or more kinds in talc, a mica, a boron compound, phosphorus compounds, a graphite, a metallic oxide, a sulfur compound, a nitride, and fluoride as an inorganic compound.

[Claim 2] The powder release agent for liquid metal forging which consists only of an organic compound used as lubricant in solid form, has the gestalt of that an organic compound is powdered or granularity, and is characterized by using one or more of two or more kinds of metallic soap, or two or more kinds of high molecular compounds as an organic compound.

[Claim 3] It is the release agent which comes to mix the inorganic compound used as lubricant in solid form, and the organic compound used as lubricant by the solid-state. It has the gestalt by which both have the gestalt of powdered or granularity, or the inorganic compound was covered with the organic compound. As an inorganic compound The powder release agent for liquid metal forging characterized by using one or more of two or more kinds of metallic soap, or two or more kinds of high molecular compounds as an organic compound using one or more kinds among talc, a mica, a boron compound, phosphorus compounds, a graphite, a metallic oxide, a sulfur compound, a nitride, and fluoride.

[Claim 4] The powder release agent for liquid metal forging according to claim 3 which contained the organic compound at 0.1 - 90% of the weight of a rate to the inorganic compound.

[Claim 5] Metallic soap is a powder release agent for liquid metal forging according to claim 2 or 3 which adds sodium, calcium, barium, a lithium, a potassium, magnesium, or zinc to a carboxylic-acid frame.

[Claim 6] A high molecular compound is a powder release agent for liquid metal forging according to claim 2 or 3 which is polyethylene, polypropylene, an epoxy resin, silicone resin, phenol resin, acrylic resin, an alkyd resin, or polystyrene.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the release agent sprayed and used for a metal mold inside in a liquid-metal-forging activity.

[0002]

[Description of the Prior Art] Many forging cast processes are used for manufacture of the components with which very advanced quality and dependability, such as high reinforcement, such as a wheel for automobiles, a piston, and a rocker arm, and airtightness, are demanded. And in this forging cast process, in order to avoid the direct contact to the metal mold of a die, and a molten metal, to prevent printing and to improve die releasing of a product, the release agent is used.

[0003] Generally as a release agent for liquid metal forging, the water-soluble release agent is used abundantly. Generally as for a water-soluble release agent, release agent base materials, such as water and a graphite, come to add a dispersant and an adhesion contribution agent.

[0004]

[Problem(s) to be Solved by the Invention] By the way, the demand which raises quality, an appearance, dependability, etc. to various components increases with progress of lightweight-izing especially in an automobile industry in recent years, and the release agent for filling this demand with sufficient workability has come to be demanded. And such a request is no longer satisfied to a water-soluble release agent. That is, there was a problem that it originates in the water remainder, an internal cavity occurs for a product, the dependability over proof-pressure airtightness is spoiled for this reason, and control of a die temperature is difficult since it is water solubility, and the demand of upgrading to the casting surface or appearance of a product could not be filled with a water-soluble release agent for this reason. Furthermore, in the release agent which makes a graphite a subject, there was a problem of needing the expenses for forming the facility for preventing aggravation of work environment, the waste-water-treatment facility for preventing the water pollution after use, etc. Then, a release agent of a new gestalt has come to be desired strongly.

[0005] In this invention, as a result of inquiring wholeheartedly in view of the above points and conducting various kinds of systematic experiments, it was made, therefore, to the release agent for liquid metal forging used in order to obtain in a forging cast process, without worsening an environment with workability sufficient in a product with higher dependability and quality, i.e., a concrete target It aims at offering the release agent for liquid metal forging which printing of a product and generating of an internal cavity can be prevented certainly, and die releasing from the metal mold of a product can moreover be made to perform to fitness more, and work environment is not worsened while in use, and does not pollute water quality after use further.

[0006]

[Means for Solving the Problem] The 1st powder release agent for liquid metal forging of this invention consists only of an inorganic compound used as lubricant in solid form, has the gestalt of that an inorganic compound is powdered or granularity, and is characterized by using one or more kinds in talc, a mica, a boron compound, phosphorus compounds, a graphite, a metallic oxide, a sulfur compound, a nitride, and fluoride as an inorganic compound.

[0007] The 2nd powder release agent for liquid metal forging of this invention consists only of an organic compound used as lubricant in solid form, has the gestalt of that an organic compound is powdered or granularity, and is characterized by using one or more of two or more kinds of metallic soap, or two or more kinds of high molecular compounds as an organic compound.

[0008] The 3rd powder release agent for liquid metal forging of this invention is an inorganic compound used as lubricant in solid form, It has the gestalt by which it is the release agent which comes to mix the organic compound used as lubricant in solid form, and both have the gestalt of powdered or granularity, or the inorganic compound was covered with the organic compound. As an inorganic compound It is characterized by using one or more of two or more kinds of metallic soap, or two or more kinds of high molecular compounds as an organic compound using one or more kinds among talc, a mica, a boron compound, phosphorus compounds, a graphite, a metallic oxide, a sulfur compound, a nitride, and fluoride.

[0009] It is having the gestalt of the greatest description of this invention having a powdered release agent, or granularity.

[0010] As for the content rate to the inorganic compound of an organic compound, in the powder release agent for liquid metal forging of the above 3rd, it is effective to choose from 0.1 - 90% of the weight of the range.

[0011] As metallic soap, as a high molecular compound, polyethylene, polypropylene, an epoxy resin, silicone resin, phenol resin, acrylic resin, an alkyd resin, or polystyrene is especially desirable, and what added sodium, calcium, barium, a lithium, a potassium, magnesium, or zinc to the carboxylic-acid frame is used again.

[0012] When mixing with an inorganic compound and using, these organic compounds are mixed with an inorganic compound, where it was mixed with the inorganic compound or heating melting is carried out with the gestalt of powdered or granularity. Therefore, it will have the gestalt which has the gestalt of that both an inorganic compound and the organic compound of the powder release agent for liquid metal forging of the above 3rd are powdered, or granularity or by which the inorganic compound of powdered or granularity was covered with the organic compound. in addition, one kind of the compound which mentioned the organic compound above — or two or more kinds combine and it is used. You may use combining metallic soap and a high molecular compound.

[0013]

[Function] Since it has the gestalt of that the powder release agent for liquid metal forging of this invention is powdered, or granularity, in the part of a metal mold inside which adhered to the release agent, a product and a metal mold inside will be

certainly separated only for the powder of a release agent, or the particle diameter of granulation at least. Therefore, when a metal mold inside adheres to a release agent uniformly, printing by a product and a metal mold inside contacting directly is prevented certainly, and the quality of a product improves.

[0014] Moreover, since only an organic compound consists only of mixture of an organic compound and an inorganic compound and only an inorganic compound does not contain moisture, as for the release agent of this invention, the defect which originates in the interior of a product at the water remainder does not generate it. Therefore, the airtightness of a product improves, for this reason, pressure resistance also improves, and the dependability of a product improves. Moreover, since the release agent of this invention does not contain moisture, control of a die temperature is easy and the quality about the casting surface and appearance of a product improves.

[0015] Moreover, since it has the gestalt of that the release agent of this invention is powdered, or granularity and moisture is not contained, the tension committed between a metal mold inside and a product is weak. Therefore, drawing from the metal mold of a product becomes easy. And it is easily removed from a metal mold inside and a product front face. That is, workability improves.

[0016] Furthermore, since the release agent of this invention has the gestalt of powdered or granularity, it does not carry out ***** generating of the gas that it is hard to react even if heat is added into liquid metal forging. Moreover, water quality is not polluted after use like a water-soluble release agent. Therefore, work environment is not worsened, or water quality is not polluted, and the cost for a waste-water-treatment facility etc. becomes unnecessary, and will be used cheaply.

[0017]

[Effect of the Invention] Since it has the gestalt of that the powder release agent for liquid metal forging of this invention is powdered, or granularity, especially generating of an internal defect can be prevented certainly, moreover a liquid-metal-forging activity can be made to be able to do with more sufficient workability by the ability raising printing of a product, and the quality and the dependability over proof-pressure airtightness, and aggravation of the environment under use and after use can fully be prevented further.

[0018] When mixing and using an organic compound and an inorganic compound especially, quality of the product obtained can be made better by making the content rate to the inorganic compound of an organic compound into 0.1 - 90% of the weight of the range.

[0019] Furthermore, the above-mentioned effectiveness can be demonstrated more to fitness by using the high molecular compound of the metallic soap which comes to add sodium, calcium, barium, a lithium, a potassium, magnesium, or zinc to a carboxylic-acid frame, polyethylene and polypropylene, an epoxy resin, silicone resin, phenol resin, acrylic resin, an alkyd resin, or polystyrene as an organic compound.

[0020]

[Example] Hereafter, although the example of this invention is shown, this invention is not limited to these. The release agent of (A) - (E) shown below was obtained, forging by the forging cast process was examined using these release agents, and comparison examination was carried out about each item shown in Table 1. (A) - (D) is the example of this invention, what (A) becomes only from an inorganic compound, and (B) consist only of an organic compound, the thing using both metallic soap and a high molecular compound as an organic compound and (C) consist only of an organic compound, and the thing using only the high molecular compound as an organic compound and (D) come to mix an organic compound and an inorganic compound. (E) is an example of a comparison. In addition, each compound used in the release agent of (A) - (E) is a commercial thing.

[0021] (A) The 1st example of this invention which consists of mixture of the silicon nitride (average grain size of 10micro) 30 section, the mica 60 section, and the graphite 10 section, and the (B) polypropylene 40 section, The 2nd example of this invention which consists of mixture with the calcium stearate 60 section, the 3rd example of this invention which consists of the (C) polyethylene (average grain size of 5micro) 100 section, and the (D) talc (average grain size of 6micro) 25 section, It is a principal component at the ratio of 30:2 about the 4th example, (E) graphite, and adhesion contribution agent of this invention which consists of mixture of the boron nitride (average grain size of 10micro) 10 section, and the polyethylene 65 section. The example of a comparison which is the water-soluble graphite system release agent which it comes to contain, [0022]

[Table 1]

	(A)	(B)	(C)	(D)	(E)
焼付防止効果	○	◎	◎	◎	◎
外 観	◎	◎	◎	◎	○
内部錆発生 の防止効果	◎	○	○	◎	△
作業場の環境 悪化防止効果	◎	◎	◎	◎	×

× : 全くない、△ : 小さい、○ : 普通、◎ : 大きい

[Translation done.]